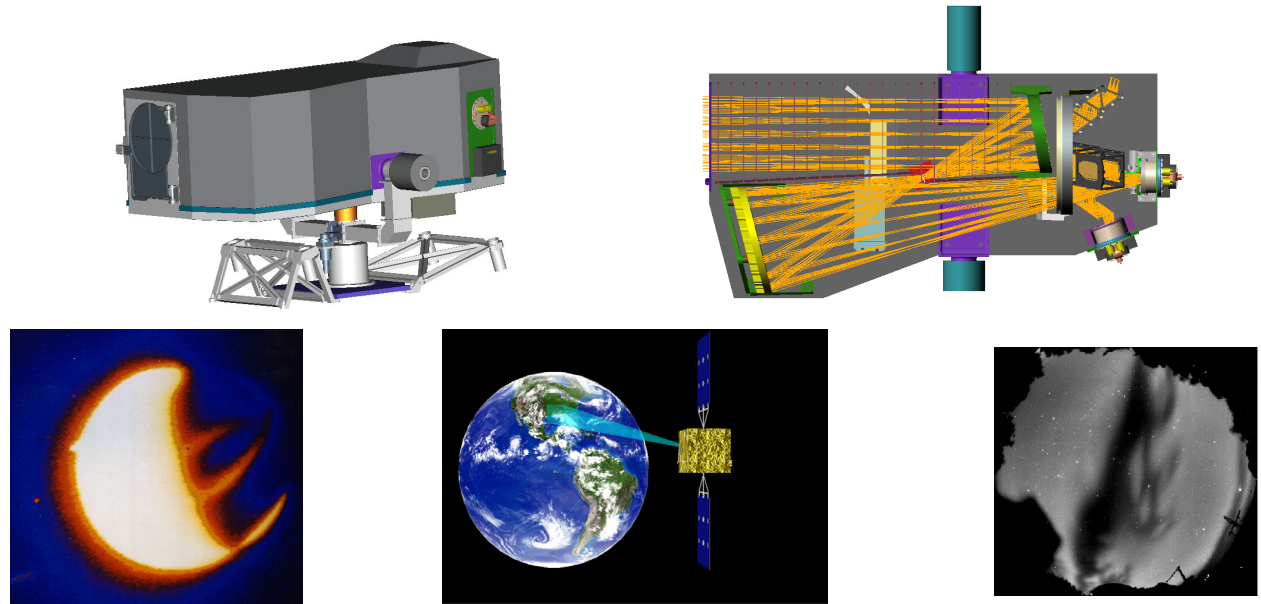


Ionospheric and Geocoronal Mapping Experiment (IMAGER)



The Ionospheric and Geocoronal Mapping Experiment (IMAGER) is an instrument now being built by NRL under ONR sponsorship that will pursue reliability in DoD communications and navigation through high-quality ionospheric imaging and monitoring. It is a multispectral far-ultraviolet telescope designed to image the upper atmosphere and ionosphere from geosynchronous orbit. It will be launched in 2006 by the Air Force Space Test Program as part of the GIFTS / IOMI mission. (GIFTS/IOMI is sponsored jointly by ONR, NASA and NOAA.) IMAGER has a field of view of 1000 km. x 1000 km. with 10 x 10 km. resolution and uses filters to isolate atomic lines of atomic oxygen (1304 and 1356 Angstroms), ionic oxygen (834 Angstroms), and molecular nitrogen (1430 Angstroms); these lines give desired diagnostics for electron content and for the density profiles of atmospheric constituents. Filters that select for any of these lines can be placed in the optical path. The instrument is mounted externally to one panel of the GIFTS/IOMI satellite and has independent offset pointing.

The primary scientific/operational objective of IMAGER is to demonstrate the ability to track a disturbed ionospheric region containing a scintillation storm in an unprecedented movie-like format with access to the whole earth. IMAGER will identify disturbances, characterize them quantitatively in the FUV, and track their movements, much as hurricanes are tracked with GOES. These storms develop much more quickly (~10 min) and propagate much faster (~100 m/s) than tropospheric weather. The geosynchronous platform frees IMAGER from limitations of earlier instruments in low earth orbit and provides a research capability the space physics community has desired for years. It gives a means of staring at a region and making a movie of it rather than revisiting it with an interval of days. This will be the first global access of the ionosphere since the Apollo Program (when NRL's far ultraviolet observatory on the moon took the first Far UV pictures of the ionosphere). The intervening

decades have seen many improvements in optics, filters, and sensors as well as in advanced theoretical modeling tools. The result of this is that much of IMAGER's effort will be devoted to gathering data needed to model fine scale changes in the ionosphere and their variability. Capability to make movies of ionospheric weather can also be correlated with other advanced atmospheric sounding. The primary instrument on the satellite is the Global Imaging Fourier Transform Spectrometer (GIFTS) which will provide new hyperspectral imagery of the troposphere and stratosphere. Thus for example IMAGER can measure ionospheric parameters directly above major tropospheric storms at the same time as GIFTS/IOMI characterizes those storms, IMAGER can make the first rigorous study of whether tropospheric weather influences the ionosphere.

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